REMARKS / ARGUMENTS

This application is believed to be in condition for allowance because the claims, as amended, are believed to be non-obvious and patentable over the cited references. The following paragraphs provide the justification for this belief. In view of the following reasoning for allowance, the Applicant hereby respectfully requests further examination and reconsideration of the subject patent application.

1.0 Claim Objections:

The Office Action objected to a typographical error in claim 1 wherein Applicants inadvertently recited "…objects us full…" instead of the intended language of "…objects is full…" Therefore, as suggested by the Office Action, Applicants have amended independent claim 1 to recite the intended term of "…objects is full…" Consequently, Applicants respectfully request withdrawal of the objection to claim 1 in view of the aforementioned amendment to claim 1.

2.0 Rejections under 35 U.S.C. §102:

In the Office Action of July 26, 2007, claims 1-7, 9-11, 13-17, and 20 were rejected under 35 U.S.C. §102(b) as being anticipated by US Patent 5754939 to Herz, et al (hereinafter "***Herz***").

A rejection under 35 U.S.C. §102(b) requires that the Applicant's invention was patented or described in a printed publication more than one year prior to the filing date of the present application by the Applicant. To establish that a patent describes the Applicant's invention, *all of the claimed elements of an Applicant's invention must be considered, especially where they are missing from the prior art*. If a claimed element is not taught in the referenced patent, then a rejection under 35 U.S.C. §102(b) is not proper, as the Applicants' invention can be shown to be patentably distinct from the cited reference.

In view of the following discussion, the Applicants will show that one or more elements of the Applicants' claimed invention are missing from the cited art, and that the Applicants' invention is therefore patentable over that cited art.

2.1 Rejection of Independent Claim 1:

In general, the Office Action rejected independent claim 1 under 35 U.S.C. §102(a) based on the rationale that the ***Herz*** reference teaches the Applicant's claimed "…system for automatically determining a set of at least one maximal utility object from a set of at least one object represented by a probabilistic model…"

Applicants believe that the Office Action has improperly characterized the capabilities and teachings of the ***Herz*** reference in an attempt to show equivalence to various elements of the Applicants claimed invention. For example, the Applicants specifically recite the identification of a set of ***maximal utility*** objects from a set of objects represented probabilistic model. It is important to understand that the "***utility***" of an object is not directly equivalent to the probability of an object. For example, paragraph [0013] of the present application specifically defines the concept of object utility as follows:

> "[0013] The present invention is capable of sorting any possible function of the probability distributions representing the objects for determining likely user choices. As mentioned above, the aforementioned ***"utilities"*** are simply any desired function of the probability distributions, and ***can be described as the value of the probability distribution evaluated at a specific point***. For example, one example of a "utility" is the probability or state representing whether a particular user watched a particular movie. Thus, in a general embodiment, the utility simply represents a specific "state" for each object or variable which corresponds to the user preferring that object in some manner. Thus, the sorting actually involves sorting on the probability of that specific state. However, ***in the more general sense, the utility is any arbitrary function of***

> ***the probability distributions; thus, the sorting actually involves sorting on the function of the probability that the user will prefer the object***."

In view of the aforementioned definition provided in the present specification, it should be clear that the "utility" associated with an object, as specifically defined in the present specification, is not itself a probability associated with that object, but is rather a ***function of the probability distribution*** associated with that object, as claimed. Therefore, sorting of object utilities is not equivalent to sorting of object probabilities since an object probability is a specific probabilistic value or score associated with some object, while an object utility is some function of the probability distribution associated with the object. In other words, an ***object probability*** is **not equivalent** to a ***function of the probability distribution associated with the object***.

In general, as summarized by the Abstract, ***Herz*** describes a scheme wherein objects, such as text documents, are evaluated to construct a "target profile for each target object" and a "target profile interest summary" for each user. ***Herz*** provides an example of a "target profile for each target object" as identifying "the frequency with which each word appears in an article relative to its overall frequency of use in all articles…" Further, ***Herz*** explains that the "target profile interest summary" associated with a particular user is a profile that "describes the user's interest level in various types of target objects." ***Herz*** then compares the target profiles of objects to the "users' target profile interest summaries to generate a user-customized rank ordered listing of target objects most likely to be of interest to each user…"

Applicants respectfully suggest that the processes described by ***Herz*** for generating "a user-customized rank ordered listing of target objects" fails completely to disclose the system claimed by the Applicants.

For example, the Office Action first suggests that ***Herz*** discloses the claimed element of "determining an upper bound determining for the utility of each object" in col. 16, lines 43-50. However, Applicants respectfully suggest that term "upper bound" as recited within col.

16, lines 43-50 of the ***Herz*** reference has been taken out of context in an attempt to show a teaching of the claimed invention. For example, a broader reading of the ***Herz*** reference, provided in col. 16, lines 28-60 recites the following:

> "In general, a system in which target objects fall into distinct sorts may sometimes have to measure the similarity of two target objects for which somewhat different sets of attributes are defined. ***This requires an extension to the distance metric d(*, *) defined above***… In certain applications, it is sufficient when carrying out such a comparison simply to disregard attributes that are not defined for both target objects: this allows a cluster of novels to be matched with the most similar cluster of movies, for example, by considering only those attributes that novels and movies have in common. However, while this method allows comparisons between (say) novels and movies, it does not define a proper metric over the combined space of novels and movies and therefore does not allow clustering to be applied to the set of all target objects. When necessary for clustering or other purposes, a metric that allows comparison of any two target objects (whether of the same or different sorts) can be defined as follows. **If a is an attribute, then let Max(a) be an <u>upper bound on the distance between two values of attribute a</u>**; notice that if attribute a is an associative or textual attribute, this distance is an angle determined by arccos, so that Max(a) may be chosen to be 180 degrees, while if attribute a is a numeric attribute, a sufficiently large number must be selected by the system designers. The distance between two values of attribute a is given as before in the case where both values are defined; the distance between two undefined values is taken to be zero; finally, the distance between a defined value and an undefined value is always taken to be Max(a)/2. **This allows us to determine how close together two target objects are with respect to an attribute a**, even if attribute a does not have a defined value for both target objects." (emphasis added)

Clearly, the ***Herz*** reference is describing a system wherein a particular attribute for each different object has an associated value (e.g., "attribute a"). Thus, given all of the values of that attribute for all objects, a maximum value is determined (e.g., "let Max(a) be an upper bound on the distance between two values of attribute a"). The term "Max(a)" is thus the

largest value seen for a particular attribute "a", and that term "Max(a)" represents an upper bound on the "distance" between two objects (assuming that one object can have a zero value for the particular attribute, and that the other object has the maximum value). In other words, the "upper bound" described by the ***Herz*** reference is simply the maximum value for some attribute among a set of objects.

Further, in col. 6, lines 18-33, the ***Herz*** reference specifically defines the term "attributes" as follows:

> "***The individual data that describe a target object and constitute the target object's profile are herein termed "attributes" of the target object***. Attributes may include, but are not limited to, the following: (1) long pieces of text (a newspaper story, a movie review, a product description or an advertisement), (2) short pieces of text (name of a movie's director, name of town from which an advertisement was placed, name of the language in which an article was written), (3) numeric measurements (price of a product, rating given to a movie, reading level of a book), (4) associations with other types of objects (list of actors in a movie, list of persons who have read a document). Any of these attributes, but especially the numeric ones, may correlate with the quality of the target object, such as measures of its popularity (how often it is accessed) or of user satisfaction (number of complaints received)." (emphasis added)

In stark contrast, the Applicants specifically claim ***determining an upper bound for the <u>utility</u> of each object***. As explained above, the term "utility" is specifically defined to be represent an "…arbitrary function of the probability distributions…" for a particular object.

Therefore, it can be seen that while the ***Herz*** reference determines a ***single*** "upper bound" ***for each particular attribute*** given all objects, the applicants are specifically claiming determining an upper bound ***for every object***. Further, the ***Herz*** reference explains that that "upper bound" represents a maximum value for ***attributes*** such as "(1) long pieces of text…, (2) short pieces of text…, (3) numeric measurements…, (4) associations with other types of objects…" etc. In contrast, the claimed upper bound is "***an upper bound for the <u>utility</u> of***

***each* object**…" As such, the applicants are claiming determining an upper bound on a function of the probability distributions associated with each individual object.

Since the ***Herz*** reference computes an upper bound on values of each individual attribute, while applicants compute upper bounds on the utilities associated with each individual object, there is no commonality between the two "upper bounds." As such, the ***Herz*** reference fails completely to disclose any of the claimed manipulations of the "upper bound" determined for each object.

Therefore, in view of the preceding discussion, it is clear that the present invention, as claimed by independent claim 1 has elements not disclosed in the ***Herz*** reference. Consequently, the rejection of claim 1 under 35 U.S.C. §102(a) is not proper. Therefore, the Applicants respectfully traverse the rejection of independent claim 1, and therefore of dependent claims 2-7 and 9, under 35 U.S.C. §102(a) in view of the language of claim 1. In particular, claim 1 recites the following novel language:

> "A system for automatically determining a set of at least one maximal utility object from a set of at least one object represented by a probabilistic model, comprising:
>
> ***determining an upper bound for the utility of each object***;
>
> sorting the objects by the ***upper bounds*** in order of highest to lowest;
>
> obtaining a set of known object values for a particular entity;
>
> using the probabilistic model in combination with the information known about an entity to begin predicting the set of maximal utility objects from the set of objects;
>
> examining the utilities associated with each object in the set of objects in the sorted order for selecting maximal utility objects until the set of maximal utility objects is full; and
>
> continuing the examination of utilities until the utility associated with a lowest utility object in the set of maximal utility objects is greater than the upper bound of the utility of a next sorted object in the set of objects." (emphasis added)

2.2 Rejection of Independent Claim 10:

In general, the Office Action rejected independent claim 10 under 35 U.S.C. §102(a) based on the rationale that the ***Herz*** reference teaches the Applicant's claimed "…computer executable instructions for dynamically extracting at least one highest probability object recommendation from a probabilistic model…" In particular, claim 10 was rejected by the Office Action using a common argument applied to independent claims 1, 10 and 17.

Applicants believe that the Office Action has improperly characterized the capabilities and teachings of the ***Herz*** reference in an attempt to show equivalence to various elements of the Applicants claimed invention. For example, the Applicants specifically recite the following limitation: "…***<u>upper bounds of particular states of probability distributions</u> for objects represented by the probabilistic model***…"

In general, as summarized by the Abstract, ***Herz*** describes a scheme wherein objects, such as text documents, are evaluated to construct a "target profile for each target object" and a "target profile interest summary" for each user. ***Herz*** provides an example of a "target profile for each target object" as identifying "the frequency with which each word appears in an article relative to its overall frequency of use in all articles…" Further, ***Herz*** explains that the "target profile interest summary" associated with a particular user is a profile that "describes the user's interest level in various types of target objects." ***Herz*** then compares the target profiles of objects to the "users' target profile interest summaries to generate a user-customized rank ordered listing of target objects most likely to be of interest to each user…"

Applicants respectfully suggest that the processes described by ***Herz*** for generating "a user-customized rank ordered listing of target objects" fails completely to disclose the system claimed by the Applicants.

For example, the Office Action first suggests that ***Herz*** discloses the claimed element of “determining an upper bound determining for the utility of each object” in col. 16, lines 43-50. However, Applicants respectfully suggest that term “upper bound” as recited within col. 16, lines 43-50 of the ***Herz*** reference has been taken out of context in an attempt to show a teaching of the claimed invention. For example, a broader reading of the ***Herz*** reference, provided in col. 16, lines 28-60 recites the following:

> “In general, a system in which target objects fall into distinct sorts may sometimes have to measure the similarity of two target objects for which somewhat different sets of attributes are defined. ***This requires an extension to the distance metric d(*, *) defined above***… In certain applications, it is sufficient when carrying out such a comparison simply to disregard attributes that are not defined for both target objects: this allows a cluster of novels to be matched with the most similar cluster of movies, for example, by considering only those attributes that novels and movies have in common. However, while this method allows comparisons between (say) novels and movies, it does not define a proper metric over the combined space of novels and movies and therefore does not allow clustering to be applied to the set of all target objects. When necessary for clustering or other purposes, a metric that allows comparison of any two target objects (whether of the same or different sorts) can be defined as follows. **If a is an attribute, then let Max(a) be an <u>upper bound on the distance between two values of attribute a</u>**; notice that if attribute a is an associative or textual attribute, this distance is an angle determined by arccos, so that Max(a) may be chosen to be 180 degrees, while if attribute a is a numeric attribute, a sufficiently large number must be selected by the system designers. The distance between two values of attribute a is given as before in the case where both values are defined; the distance between two undefined values is taken to be zero; finally, the distance between a defined value and an undefined value is always taken to be Max(a)/2. **This allows us to determine how close together two target objects are with respect to an attribute a**, even if attribute a does not have a defined value for both target objects.” (emphasis added)

Clearly, the ***Herz*** reference is describing a system wherein a particular attribute for each different object has an associated value (e.g., “attribute a”). Thus, given all of the values of that attribute for all objects, a maximum value is determined (e.g., “let Max(a) be an upper bound on the distance between two values of attribute a”). The term “Max(a)” is thus the largest value seen for a particular attribute “a”, and that term “Max(a)” represents an upper bound on the “distance” between two objects (assuming that one object can have a zero value for the particular attribute, and that the other object has the maximum value). In other words, the “upper bound” described by the ***Herz*** reference is simply the maximum value for some attribute among a set of objects.

Further, in col. 6, lines 18-33, the ***Herz*** reference specifically defines the term “attributes” as follows:

> “***The individual data that describe a target object and constitute the target object's profile are herein termed "attributes" of the target object***. Attributes may include, but are not limited to, the following: (1) long pieces of text (a newspaper story, a movie review, a product description or an advertisement), (2) short pieces of text (name of a movie's director, name of town from which an advertisement was placed, name of the language in which an article was written), (3) numeric measurements (price of a product, rating given to a movie, reading level of a book), (4) associations with other types of objects (list of actors in a movie, list of persons who have read a document). Any of these attributes, but especially the numeric ones, may correlate with the quality of the target object, such as measures of its popularity (how often it is accessed) or of user satisfaction (number of complaints received).” (emphasis added)

In stark contrast, the Applicants specifically claim “…***extracting upper bounds of particular states of probability distributions for objects represented by the probabilistic model***…” Therefore, it can be seen that while the ***Herz*** reference determines a ***single*** “upper bound” ***for each particular attribute*** given all objects, the applicants are specifically claiming determining an upper bound of particular states of probability distributions ***for every object***. Further, the ***Herz*** reference explains that that “upper bound” represents a maximum value for

attributes such as "(1) long pieces of text…, (2) short pieces of text…, (3) numeric measurements…, (4) associations with other types of objects…" etc. In contrast, the claimed upper bound is an upper bound on ***particular states of probability distributions*** for every object.

Since the ***Herz*** reference computes an upper bound on values of each individual attribute, while applicants compute upper bounds on particular states of the probability distributions associated with each individual object, there is no commonality between the two "upper bounds." As such, the ***Herz*** reference fails completely to disclose any of the claimed manipulations of the "upper bound" determined for each object.

Therefore, in view of the preceding discussion, it is clear that the present invention, as claimed by independent claim 10 has elements not disclosed in the ***Herz*** reference. Consequently, the rejection of claim 10 under 35 U.S.C. §102(a) is not proper. Therefore, the Applicants respectfully traverse the rejection of independent claim 10, and therefore of dependent claims 11, and 13-16, under 35 U.S.C. §102(a) in view of the language of claim 10. In particular, claim 10 recites the following novel language:

> "A computer-readable medium having computer executable instructions for dynamically extracting at least one highest probability object recommendation from a probabilistic model without examining all possible probabilistic recommendations from the probabilistic model, said computer executable instructions comprising:
>
> ***extracting upper bounds of particular states of probability distributions for objects represented by the probabilistic model***;
>
> sorting the ***upper bounds*** in order of highest to lowest;
>
> examining objects represented by the probabilistic model in order of the sorted ***upper bounds*** for each object for determining at least one highest probability object recommendation; and
>
> terminating the examination of the objects as soon as the ***upper bound*** of the lowest probability recommended object is greater than an upper bound of a next sorted object." (emphasis added)

2.3 Rejection of Independent Claim 17:

In general, the Office Action rejected independent claim 17 under 35 U.S.C. §102(a) based on the rationale that the ***Herz*** reference teaches the Applicant's claimed "…method for determining at least one highest probability recommendation from a probabilistic model…" In particular, claim 10 was rejected by the Office Action using a common argument applied to independent claims 1, 10 and 17.

Applicants believe that the Office Action has improperly characterized the capabilities and teachings of the ***Herz*** reference in an attempt to show equivalence to various elements of the Applicants claimed invention. For example, the Applicants specifically recite the following limitation: "…***determining an <u>upper bound of a particular state of the probability distribution</u> representing each object***…"

In general, as summarized by the Abstract, ***Herz*** describes a scheme wherein objects, such as text documents, are evaluated to construct a "target profile for each target object" and a "target profile interest summary" for each user. ***Herz*** provides an example of a "target profile for each target object" as identifying "the frequency with which each word appears in an article relative to its overall frequency of use in all articles…" Further, ***Herz*** explains that the "target profile interest summary" associated with a particular user is a profile that "describes the user's interest level in various types of target objects." ***Herz*** then compares the target profiles of objects to the "users' target profile interest summaries to generate a user-customized rank ordered listing of target objects most likely to be of interest to each user…"

Applicants respectfully suggest that the processes described by ***Herz*** for generating "a user-customized rank ordered listing of target objects" fails completely to disclose the system claimed by the Applicants.

For example, the Office Action first suggests that ***Herz*** discloses the claimed element of "determining an upper bound determining for the utility of each object" in col. 16, lines 43-

50. However, Applicants respectfully suggest that term “upper bound” as recited within col. 16, lines 43-50 of the ***Herz*** reference has been taken out of context in an attempt to show a teaching of the claimed invention. For example, a broader reading of the ***Herz*** reference, provided in col. 16, lines 28-60 recites the following:

> “In general, a system in which target objects fall into distinct sorts may sometimes have to measure the similarity of two target objects for which somewhat different sets of attributes are defined. ***This requires an extension to the distance metric d(*, *) defined above***… In certain applications, it is sufficient when carrying out such a comparison simply to disregard attributes that are not defined for both target objects: this allows a cluster of novels to be matched with the most similar cluster of movies, for example, by considering only those attributes that novels and movies have in common. However, while this method allows comparisons between (say) novels and movies, it does not define a proper metric over the combined space of novels and movies and therefore does not allow clustering to be applied to the set of all target objects. When necessary for clustering or other purposes, a metric that allows comparison of any two target objects (whether of the same or different sorts) can be defined as follows. **If a is an attribute, then let Max(a) be an <u>upper bound on the distance between two values of attribute a</u>**; notice that if attribute a is an associative or textual attribute, this distance is an angle determined by arccos, so that Max(a) may be chosen to be 180 degrees, while if attribute a is a numeric attribute, a sufficiently large number must be selected by the system designers. The distance between two values of attribute a is given as before in the case where both values are defined; the distance between two undefined values is taken to be zero; finally, the distance between a defined value and an undefined value is always taken to be Max(a)/2. **This allows us to determine how close together two target objects are with respect to an attribute a**, even if attribute a does not have a defined value for both target objects.” (emphasis added)

Clearly, the ***Herz*** reference is describing a system wherein a particular attribute for each different object has an associated value (e.g., “attribute a”). Thus, given all of the values of that attribute for all objects, a maximum value is determined (e.g., “let Max(a) be an upper

bound on the distance between two values of attribute a"). The term "Max(a)" is thus the largest value seen for a particular attribute "a", and that term "Max(a)" represents an upper bound on the "distance" between two objects (assuming that one object can have a zero value for the particular attribute, and that the other object has the maximum value). In other words, the "upper bound" described by the ***Herz*** reference is simply the maximum value for some attribute among a set of objects.

Further, in col. 6, lines 18-33, the ***Herz*** reference specifically defines the term "attributes" as follows:

> "***The individual data that describe a target object and constitute the target object's profile are herein termed "attributes" of the target object***. Attributes may include, but are not limited to, the following: (1) long pieces of text (a newspaper story, a movie review, a product description or an advertisement), (2) short pieces of text (name of a movie's director, name of town from which an advertisement was placed, name of the language in which an article was written), (3) numeric measurements (price of a product, rating given to a movie, reading level of a book), (4) associations with other types of objects (list of actors in a movie, list of persons who have read a document). Any of these attributes, but especially the numeric ones, may correlate with the quality of the target object, such as measures of its popularity (how often it is accessed) or of user satisfaction (number of complaints received)." (emphasis added)

In stark contrast, the Applicants specifically claim "…***<u>determining an upper bound of a particular state of the probability distribution representing each object</u>***…" Therefore, it can be seen that while the ***Herz*** reference determines a ***single*** "upper bound" ***for each particular attribute*** given all objects, the applicants are specifically claiming determining an upper bound of particular states of probability distributions ***for every object***. Further, the ***Herz*** reference explains that that "upper bound" represents a maximum value for ***attributes*** such as "(1) long pieces of text…, (2) short pieces of text…, (3) numeric measurements…, (4) associations with other types of objects…" etc. In contrast, the claimed upper bound is an upper bound on ***particular states of probability distributions*** for every object.

Since the ***Herz*** reference computes an upper bound on values of each individual attribute, while applicants compute upper bounds on particular states of the probability distributions associated with each individual object, there is no commonality between the two "upper bounds." As such, the ***Herz*** reference fails completely to disclose any of the claimed manipulations of the "upper bound" determined for each object.

Therefore, in view of the preceding discussion, it is clear that the present invention, as claimed by independent claim 10 has elements not disclosed in the ***Herz*** reference. Consequently, the rejection of claim 17 under 35 U.S.C. §102(a) is not proper. Therefore, the Applicants respectfully traverse the rejection of independent claim 17, and therefore of dependent claim 20 under 35 U.S.C. §102(a) in view of the language of claim 17. In particular, claim 17 recites the following novel language:

> A method for determining at least one highest probability recommendation from a probabilistic model, said model representing at least one object using a probability distribution for representing each object, comprising:
>
> ***<u>determining an upper bound of a particular state of the probability distribution representing each object</u>***;
>
> sorting each object represented by the probabilistic model by sorting the ***upper bounds*** associated with each object in order of highest to lowest;
>
> determining a set of user preferences for a particular user;
>
> extracting at least one highest probability recommendation from the probabilistic model based on the set of user preferences for the particular user, wherein the objects represented by the model are examined in the sorted order for extracting the at least one highest probability recommendation; and
>
> terminating the examination of the objects and the extraction of highest probability recommendations as soon as a lowest upper bound of any of the highest probability recommendations is greater than an ***upper bound*** of a next sorted object.

CONCLUSION

In view of the above discussion, it is respectfully submitted that claims 1-23 are in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to withdraw the outstanding rejection of claims 1-23 and objection to claims 8, 12, 18, 19 and 21-23. Consequently, Applicant respectfully requests that claims 2-10, 23-30, 43-48, and 63 be reentered into the present application in view of the allowability of these claims. Finally, in an effort to further the prosecution of the subject application, the Applicant kindly invites the Examiner to telephone the Applicant's attorney at (805) 278-8855 if the Examiner has any additional questions or concerns.

Respectfully submitted,

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